

Talking Fish

Co-operation and communication in the Dutch North Sea herring fisheries, c. 1600-1850

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CHAPTER THIRTEEN

TALKING FISH CO-OPERATION AND COMMUNICATION IN THE DUTCH NORTH SEA HERRING FISHERIES, C. 1600–1850

Bo Poulsen

Introduction

This study applies economic resource theory and results of modern anthropological case studies in order to discuss information sharing in a historical context, which had a distinctly institutional, technological and cultural set-up. The Dutch North Sea herring fishery of the early modern era is found to have been managed and organised in a way that favoured large-scale co-operation and sharing of fishermen's knowledge on where to fish.¹

The historical data material consists of normative as well as empirical sources. The normative part is an analysis of the regulatory body, the *College van de Grote Visserij*, which dealt with how the fishermen interacted at sea. For reconstructing the empirical past, registers of landings of herring in the Netherlands, and readings of diaries and logbooks kept aboard fishing vessels, are other important sources in this study. They all provide the documentation for an assessment of formal as well as informal systems providing different levels of co-operation and communication within the Dutch North Sea herring fisheries. The

¹ This paper refers to results from my PhD project on 'The exploitation of the North Sea marine resources, c. 1600–1850'. I thank my supervisors professors Poul Holm and Brian R. MacKenzie as well as René Taudal Poulsen, Christiaan van Bochove and Jan P. van de Voort. I gratefully acknowledge financial support for this project from the History of Marine Animal Populations (HMAP) project of the Census of Marine Life (CoML), Danish Network for Fisheries and Aquaculture Research (Fishnet.dk), Marine Biodiversity and Ecosystem Functioning EU Network of Excellence (MARBEF), Consequences of weather and climate changes for marine and freshwater ecosystems (CONWOY) and Maritime History and Marine Environmental Research School (MARINERS), Centre for Maritime and Regional Studies.

analysis shows that the fishermen communicated intensely with each other. They helped one another to find the herring at sea, which is found to be in concordance with environmental and institutional incentives found in modern fisheries. The article further discusses to what extent valuable information on the fishing grounds were freely shared. Here, the origin of the skipper seems to have played a role for how much the Dutch fishermen interacted with each other.

Theories on fishermen's behaviour

The behaviour and interaction within groups of fishermen at sea is an important aspect in any large-scale fishing operation. From the point of view of fisheries management, it is desirable to understand how different strategies of a group of fishermen influence the fishing effort and thereby fishing pressure on a given limited natural resource. In an assessment of the economic performance of a fishing fleet, it is likewise of interest to know which type of behaviour is adopted by the individual fisherman, as well as by the group as a whole.

In the view of marine scientists Ray Hilborn and Carl J. Walters, the issue of fishermen's behaviour is still poorly understood. In 1992 they wrote in their highly influential study *Quantitative Fisheries Stock Assessment*: 'Fleet dynamics is probably the most understudied subject in fisheries'. Later in the same chapter they go on to say that fisheries science will be far richer, and our understanding of how fisheries behave advanced further, if half the energy that goes into biological studies of fish were devoted to behavioural studies of fishermen.² Having recognised the need for such studies, however, the same study itself takes a rather narrow view on the behaviour of modern fishermen: 'In making the supposition that fishermen have dynamics analogous to natural predators, we are taking a competitive and market-oriented view of the economics of fishing; this is more realistic for most fisheries than to assume that fishing is a communal, cooperative, and altruistic process.'³ This view is modified in a recent introduction to *Marine Fisheries Ecology*, where the authors put forward that, 'fishing is not just about catching fish and making money; rather it is bound up in the culture of

² Hilborn and Walters (1992) 153–154.

³ Hilborn and Walters (1992) 104.

coastal societies'.⁴ A similar recognition of taking economic and social as well as environmental factors into consideration when analysing the behaviour of fishermen has emerged within resource economics. In a now classic 1954 article on common property resources, the Canadian economist H. Scott Gordon proposed that in an *open access* fishery, new fishermen will enter the fishery until the profit margin reaches zero. This is because of the law of diminishing returns. Under an unregulated private exploitation the marine resource in question will yield no rent, either because of economic problems or because of depletion of the natural resource. However, if fishermen succeed in placing their activity within some sort of social control, they can make a greater profit. For instance, fishermen would turn the open resource into a local monopoly by regulating entry of new fishermen and controlling their own operations. The fishery thereby changes from being an entirely open access fishery into a *limited entry* fishery.⁵

In 1968, the biologist Garrett Hardin also dealt with the problem of common property resources, and proposed that common property resource exploitation would inevitably lead to a severe depletion of the natural resource. In describing this process he coined the term 'Tragedy of the Commons'.⁶ This problem is highly relevant to many modern fisheries, but already in the period of c. 1600–1850, the Dutch North Sea herring fisheries did not extract enough fish from the sea in order for the North Sea herring populations to be affected. For 2003, the International Council for the Exploration of the Seas assessed that 400,000 tonnes of herring could be fished from the North Sea without causing the stock to be depleted.⁷ By comparison, the Dutch North Sea herring fishery never exceeded an annual catch of more than 60–70,000 tonnes.⁸

What neither theory deals with, though, is the problem of *finding* the fish, but this has been discussed by economist James A. Wilson. He adds to the above theories that every fisherman has a learning problem when searching for fish. Since the ocean is large, no individual fisherman acting alone could hope to acquire the experience necessary to establish the regularity or predictability required for a successful exploitation

⁴ Jennings *et al.* (2001) 126.

⁵ Gordon (1954) 124–142.

⁶ Hardin (1968) 1243–1248.

⁷ ICES (2003) 34.

⁸ Van Bochove (2004) 27.

of large marine resources. Rather, fishermen need to co-operate and exchange information with other fishermen. But whoever catches the fish owns the fish, and this gives an incentive for individual rather than collective acquisition of new knowledge.

Knowledge of good fishing places therefore becomes a potentially important economic asset, but it depends on the nature of the natural resource being exploited. Some fish aggregate in groups, such as herring schools, which are known as patches. If the individual fisherman has the capacity and technology to completely exhaust a patch of fish on his own, he does not have an incentive to share his acquired knowledge of this particular patch of fish. If, however, there is plenty of fish available once a patch is located, the fisherman finding the patch is holding a valuable asset, which he can exchange for similarly valuable assets from other fishermen he trusts. When such a phenomenon occurs and fishermen collaborate, they are forming a *club*.⁹

Economist Neal Stuart Johnson has compared a number of empirical studies on information sharing in *limited entry fisheries*. A limited entry fishery is one where only fishermen with formal licences to fish are taking part in the fisheries. The contrast is known as *open access* fisheries, where fishermen can enter and leave a distinct fishery as they please. Johnson concludes in agreement with the above-mentioned incentives pointed out by Wilson that, especially in herring fisheries, formation of information sharing clubs occur.¹⁰ This has to do with herring being a highly migratory species aggregating in schools or patches often larger than the capacity of any boat in the fleet, and located far from the fleet's port of origin. The benefits of a co-ordinated search would then tend to be relatively high, and catch reduction costs relatively low. This favours relatively small and stable groups of co-operating fishermen and disadvantages the position of independent, non-cooperating fishermen. In economic theory this type of fishermen is called a *free rider*.¹¹

As mentioned above, recent research points to an increasing awareness of the role of social and cultural factors in fishing strategies, such as the fisherman's choice to fish alone or within more or less loosely formed clubs of information sharing. The set-up of a fishing fleet operating far away from home targeting a migratory species such as North Sea her-

⁹ Wilson (1990) 12–29.

¹⁰ Johnson (1993) 108–126.

¹¹ Wilson (1990) 24.

ring, but without risking overexploitation of the fish stock, reflects the challenges facing an early modern high sea fishing operation such as the Dutch North Sea herring fisheries. In line with the above theories, it is assumed that they would expect to catch more and reap a larger profit the more they co-operated when fishing. So, how well did the Dutch herring fishery conform to modern theories on information sharing in limited entry fisheries? The economic culture of any past or contemporary commercial fishery is much influenced by its historical setting. In order to properly assess the significance of the fisheries strategy in the Dutch herring fisheries, it is useful to situate it in its early modern historical context.

Fishing strategies within the College van de Grote Visserij

The first modern fishery

The historians Jan de Vries and Ad van de Woude have characterised the Dutch Republic as the world's first modern economy. While not modern in the sense of our current industrial economy, they found nonetheless a number of qualities which set the Dutch apart from the rest of Europe, from around 1500 until the advent of the industrial revolution. Among these qualities were the existence of relatively free markets for commodities as well as for labour, land, and capital. The Dutch also had a substantial agricultural productivity, which enabled a complexity in social and occupational structures that made possible an extensive division of labour. Moreover, the Dutch Republic was a state whose policy making and enforcement was conscientious to property rights, negotiation and upholding of contracts, as well as the material well being of its inhabitants. Finally, De Vries and van der Woude found a level of technology and organisation capable of sustained development of a material culture with the capacity to sustain a consumer behaviour oriented towards the market.¹² In their analyses of a variety of economic sectors in Europe, de Vries and Van de Woude concluded that, in the heyday of the seventeenth century, the Dutch herring fisheries held a

¹² De Vries and van der Woude (1997) 693.

status and profile in terms of employment and capital investment unlike any other branch of economic activity.¹³

In the 1560s a number of Dutch towns formed a regulatory body, known as the *College van de Grote Visserij*, which during the last decades of the sixteenth century was granted a privilege by the States of Holland. The *College* was thereby given jurisdiction over the entire Dutch herring industry with respect to the catch, processing, distribution, and marketing of salted herring.¹⁴ The privileged towns forming the *College* upheld a monopoly of the landing of salted herring in the Netherlands until the 1850s. The *College* regulated the size and use of the fishing gear, driftnets, and the length of the season. Regulations are common features of the management of modern fisheries resources; in the twenty-first century fisheries they are mainly introduced with the objective of preserving fish stocks and ocean biodiversity against human exploitation. In the early modern era, however, the main purpose of the regulations of the *College* was to preserve the quality of what was the top brand of salted herring in Europe.

The season started on the eve of St. John's day, 24 June. Following a government decree of 1582, the fishermen were not allowed to fish for herring after 31 December. In 1604, however, the fishing season was extended to 31 January.¹⁵ These key dates remained the law until the *College* was finally dissolved in 1857. The main body of the laws of the *College* stemmed from 1580, and continued unchanged until the Batavian Republic imposed a new but only slightly updated set of rules in 1801. The last renewal of regulations under the auspice of the *College* was in 1827.¹⁶

According to De Vries and van de Woude, the regulatory measures forced the fishermen to function as a sort of consortium, which produced and sold a standardized product. The *College* oversaw that the large (up to 1.4 km long) driftnets (spanning 22,000 m² when set out) had the right height and length and a standardised mesh size.¹⁷ The process of curing the catch aboard large factory-like ships, herring busses, the size of the barrels used for packing the salted herring, the quality of salt used as well as the branding of the finished product

¹³ De Vries and van der Woude (1997) 266.

¹⁴ Mietes (1984,1) 11–18.

¹⁵ Kranenburg (1946) 151–155.

¹⁶ Mietes (1984,2) 166–172.

¹⁷ Tillema (1917) 104.

ashore were all carried out in the manner prescribed by the *College*.¹⁸ In other words, the Dutch herring fishery was in many ways a representative of the first modern economy, hence they could be termed the *first modern fishery*.

When the *College* was first inaugurated in 1567, representatives from thirteen different towns and villages participated, but already by 1600 the *College* consisted of representatives from towns from the two main administrative areas of the Holland province. From the Noorderkwartier, Enkhuizen sent deputies to the *College*, while the Zuiderkwartier towns of Delftshaven, Brielle, Rotterdam and Schiedam also held seats in the *College*. During the eighteenth century the neighbouring towns of Vlaardingen and Maassluis became the main entrepôt for salted herring, landing more than half the total Dutch production.¹⁹ The main herring ports of the Dutch Republic are shown on the map (figure 1).

Not until 1795 did Vlaardingen and Maassluis receive the formal rights to participate in the management of the *College*. After the Napoleonic Wars the *College* was reorganised, and in 1822 the management was appointed by the towns of Vlaardingen, Maassluis, Enkhuizen, De Rijp, Amsterdam, and Rotterdam.²⁰ The distance between the towns along the River Maas in the Zuiderkwartier and Enkhuizen and De Rijp in the North is almost 100 kilometres, so one might expect fishermen to form informal sub-alliances within the greater community of the *College*. One would also expect that fishermen would be working more closely together with other fishermen from their home town or region than they would with neighbouring towns and regions.

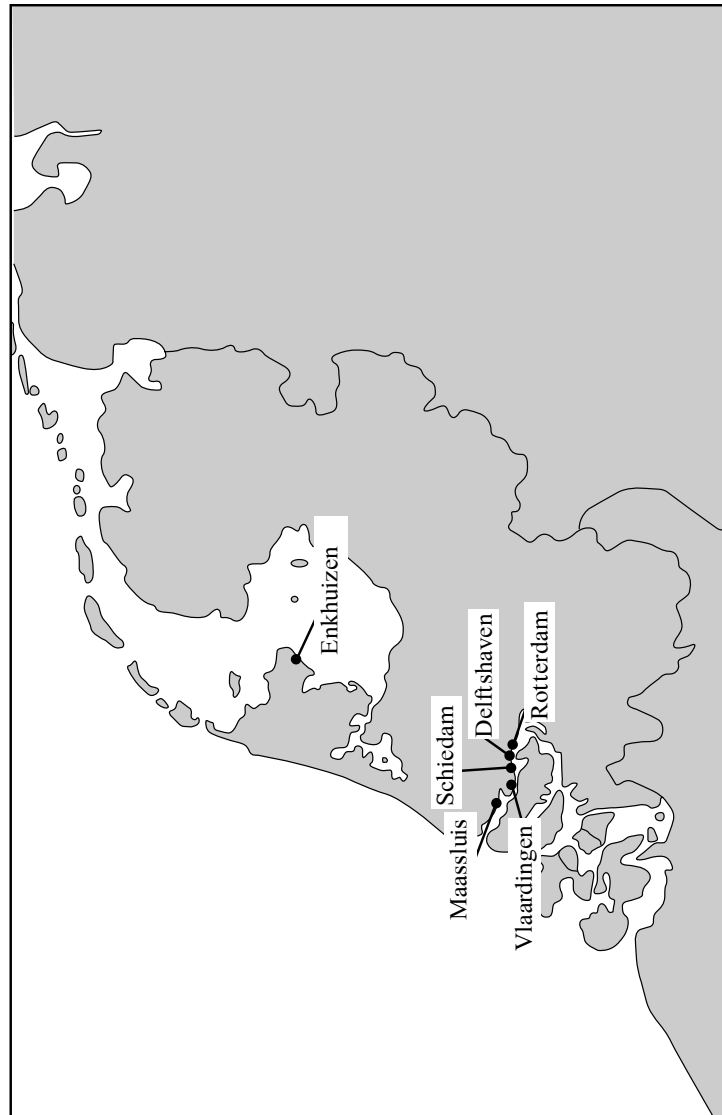
In this way, the behaviour of the Dutch fishermen could be analyzed as any well-regulated, large-scale capitalist enterprise. When it comes to the fishing strategy, it can be said that the fishing *club* of the *College* provided the framework for a *limited entry fishery* into the Dutch North Sea herring fishery. But to what extent did the fishermen interact and collaborate when fishing? This can be considered by examining testimonies of actual behaviour on the fishing grounds. One of the instruments of cooperation was the concept of *ventjagers*. These were boats that joined the herring busses at sea to buy their catch, in order

¹⁸ Kranenburg (1946) 18–22.

¹⁹ Kranenburg (1946) 180–181.

²⁰ Mietes (1984,2) 171.

Fig. 1. The map shows the towns engaged in the herring fishery of the Dutch Republic, all located in the coastal province of Holland. The main cluster of towns were located along the mouth of the River Maas in the southern part of the province, the Zuiderkwartier, while Enkhuizen and later Amsterdam were both situated in the northern part of Holland, in the Noorderkwartier.



to sell the first herring of the new season, before the herring busses would return to shore.

Ventjagers

The *College* had an interest in controlling the market for salted herring. Prices were highest in the beginning of the season, in June, July, and August, when the quality peaked and the European markets longed for freshly salted herring. This would give some fishermen an incentive to rush home with a boat half-empty, if they had been lucky during the very first days of fishing and caught a high number of herring relative to other fishing boats fishing within the *College van de Grote Visserij*. This would give the faster fisherman a relative advantage over the majority, but not necessarily lead to an increase in profits of the fleet as a whole.

The *College* had already had the foresight to regulate this traffic in 1604. From 1632 onwards, the rules of the *College* stipulated that no fishing vessel was allowed to leave the fishing grounds and return home before 15 July, and that arriving inside the coast line was not legal before 19 July.²¹ In cases of violation of this rule the offender was to pay a huge fine. In the early 1800s the fine was 3,000 guilders, or what was seen as the equivalent of the worth of a full shipload of herring.

The origin of the *ventjagers* is almost as old as the Dutch high seas herring fishery itself, and they are first mentioned in the fifteenth century. The 1632 regulations also stipulated that the only vessels allowed to enter a Dutch port with herring prior to the 19 July were the *ventjagers*. The period from the start of the fishery on 24 June until 15 July was even known as the *jaagtijd*, meaning the time when the *ventjagers* were buying up fish in open sea.²²

The *ventjagers* were often older fishing vessels, which were transformed into pure cargo vessels. Any merchant could apply to the college for sending out *ventjagers* that would buy up herring from the fishing vessels in open sea. Normally the *ventjagers* were financed and manned by members of the herring fishing community operating within the *College*. The *ventjager* vessels would then sail in the proximity of the herring vessels and collect barrels of salted herring from different

²¹ Beaujon (1885) 51–53.

²² 'Articulen', NA, ACGV. inv. no. 686, p. 12 and Assenberg (2001) 8–9.

vessels. The herring landed by the *ventjagers* could then be sold for a very high price, and the profit shared between the *ventjagers* and the fishing boats that had initially caught the herring. Each crew of fishermen that had given over fish to the ventjager at sea received payment in proportion to how much the crew had handed over. If a ship acted like a ventjager without prior consent of the *College*, it would be fined 1,000 guilders.²³

A further institutional tightening of the business of *ventjagers* came in 1725 with the set-up of the *Gemeenschap van ventjagerije*, or the community of ventjagers. Thereafter the ship-owners organised in the *College* consented to having a certain number of *ventjagers* joining the fishing fleet each year. They also agreed upon how much the merchants aboard the *ventjagers* had to pay for a barrel of salted herring. They even agreed on how much every *ventjager* was supposed to buy up and bring home. In order that everybody was aware of this, a list of *ventjagers* was drawn up each year, stipulating, for instance, that the first *ventjager* went to one of the towns of the Zuiderkwartier, the second *ventjager* to Enkhuizen in the North, the third and forth *ventjager* to the Zuiderkwartier, etc., furthering the ship-owners' monopolistic control over the production side of the herring industry.²⁴ Thus, by law the ventjagers acted as instruments of cooperation between the fishermen of the various towns represented in the *College*.

Another aspect of the 1725 laws was that each *ventjagers* should sail with a distinct flag showing which town it came from. The regulations, however, did not stipulate whether the ventjagers from one town could receive herring from any vessel, including vessels belonging to another port than that of the ventjager itself. So, how did the ventjagers operate, once they left the shores of Holland? Would they co-operate more with their next door neighbours, rather than with vessels from the other end of Holland? The process of selling herring can be traced through testimonies that every skipper of a ventjager, along with two other members of the crew, had to give to the local clerk of the *College van de Grote Visserij* upon arrival in Holland. For some of the towns in the *College*, records of these testimonies have survived, facilitating an assessment of the pattern of buying fish in open sea. Two years, 1680 and 1720,

²³ 'Articulen', NA, ACGV, inv. no. 686, p. 32.

²⁴ Akveld (1977) 324.

were chosen as samples to investigate *ventjagers* buying salted herring and landing them in Schiedam.

Selling herring to Schiedam ventjagers

The selected *ventjagers* bought herring at sea from skippers coming from all over the Holland province.²⁵ In 1680, three *ventjagers*, and in 1720, five *ventjagers*, supplied testimonies of their business in Schiedam. Each testimony included references to every acquisition of herring, noting the date, the amount of herring, the name of the skipper, and for most references also the hometown of the skipper. The skippers mostly came from towns that took part in the *College*, such as Enkhuizen or Schiedam, but other towns were also recorded as the skipper's hometown (see figure 2). In order to see if the *ventjagers* cooperated with any fishermen within the *College van de Grote Visserij*, the assumption is made that skippers coming from an area in the Noorderkwartier would be fishing out of Enkhuizen, and that skippers from the southern parts of the Holland province would be fishing out of one of the towns of the Zuiderkwartier. The skippers from Schiedam landed their catch in their hometown.

Figure 2 demonstrates how the *ventjagers* bought herring from fishermen from any part of Holland, which has a further implication. The *ventjagers* in question bought most of their herring on three to four specific dates, and during one day they would receive herring from a great number of skippers. Furthermore these skippers would come from anywhere in Holland. This suggests that co-operation and communication between fishermen was not limited within one town, but that fishermen of all areas were fishing within a short sailing distance of each other. The business of the *ventjagers* as well as the fishery itself thus does not seem to have actually excluded some areas in favour of others. But did the *ventjagers* buy fish more often from ships of their hometown, Schiedam, as opposed to more distant colleagues?

Figure 3 shows the origin of the 66 skippers identified as having handed over salted herring to a Schiedam *ventjager* in 1680. Divided into the three designated categories above, the percentage of skippers coming from one of the designated areas is compared with the relative standing of the same areas in terms of total annual landings of salted

²⁵ GA Schiedam, Gerechten van Schiedam, inv. no. 618 and 621.

Fig. 2. Hometown of skippers selling herring to Schiedam *ventjagers*.

1680		1720	
Hometown	no. Skippers	Hometown	no. Skippers
Schiedam	16	Schiedam	27
Rest of Zuiderkwartier			
Maassluis	2	Maassluis	4
Rotterdam	1	Rotterdam	12
Vlaardingen	7	Vlaardingen	16
Delfshaven	7	Delfshaven	5
Brielle	9		
Katwijk	2	Katwijk	1
Noordwijk	1	Noordwijk	3
Scheveningen	1		
Noorderkwartier			
Enkhuizen	8	Enkhuizen	2
Texel	3	Texel	1
Petten	1	Petten	1
Egmond	3	Marken	5
Broeckhuizen	1	De Rijp	1
Venhuizen	3		
Graft	1		
Unidentified	8	Unidentified	2
Total	74		80

herring. Figure 4 gives the same comparison for 78 skippers in the year of 1720.

The results show for 1680, as well as for 1720, that less than 15 percent of the Dutch production of salted herring was landed in Schiedam. In 1680, however, the Schiedam *ventjagers* bought herring from a Schiedam herring vessel once out of four times, and in 1720 every third purchase of herring stemmed from a Schiedam skipper. The other areas of the Zuiderkwartier also figured more heavily in the statistics of the *ventjagers*, whereas they had a representative share of the offshore acquisitions in 1720.

Interestingly though, the Noorderkwartier located far away from the Schiedam merchants operating the *ventjagers* did not appear as often in the landings as their share of the total production of herring might

Fig. 3. Origin of the 66 skippers selling herring to the three *ventjagers* landing in Schiedam, 1680. Divided into the three designated categories above, the percentage of skippers coming from one of the designated areas is compared with the relative standing of the same areas in terms of total annual landings of salted.

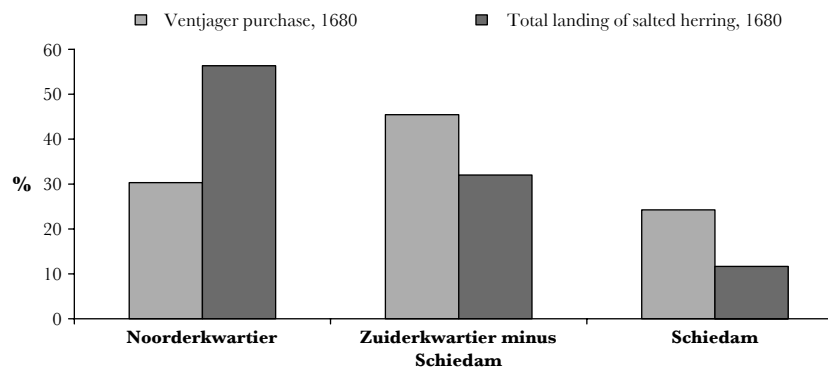
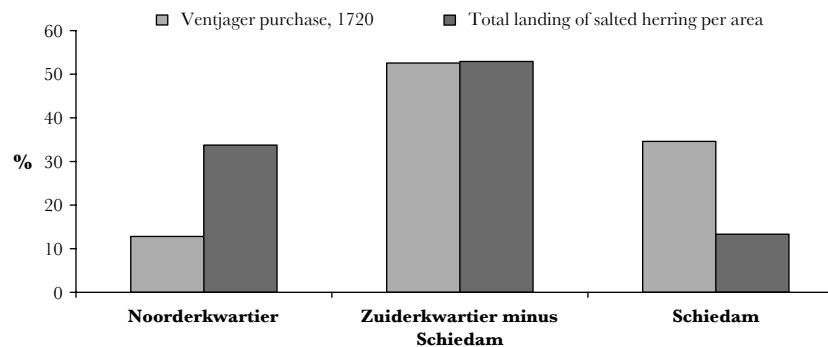


Fig. 4. Origin of 78 skippers selling herring to five *ventjagers* landing in Schiedam, 1720. Divided into the three designated categories above, the percentage of skippers coming from one of the designated areas is compared with the relative standing of the same areas in terms of total annual landings of salted herring.



suggest. In 1680, more than 56 percent of all salted herring in Holland was landed in Enkhuizen, but only three times out of every ten did the *ventjagers* from Schiedam buy herring from a skipper based in the Noorderkwartier.

The evidence suggests, therefore, that the business of the *ventjagers* was an important part of the cooperative nature of the Dutch North Sea herring fishery. By law, they operated as a joint venture between all participating towns in the *College van de Grote Visserij*, and in practice the *ventjagers* from Schiedam also facilitated fishermen from all over Holland. But, when looking at the composition of fishermen selling to the *ventjagers*, a distinct bias occurs favouring the local fishermen from Schiedam. There can be two rationalities behind this.

The main objective for the Schiedam merchant investing in a *ventjager* was to maximise the acquisition of herring as a *ventjager*, regardless of its provenance. The merchant was likely to have financial and social ties to the local ship-owners and the skippers of the herring industry, other than that of an offshore fish buyer. In Vlaardingen in the first half of the nineteenth century, the herring skippers seemed to change frequently between commanding a *ventjager* and one of the herring vessels.²⁶ One other possible reason for the apparent bias in favour of the Schiedam fishermen could be found in the fishing operation itself. Assuming that skippers from Schiedam and possibly the other towns in the Zuiderkwartier were fishing alongside each other, rather than randomly with skippers from all over Holland, then the *ventjagers* could easily primarily stay with their own townsmen, and buy fish from them.

Did the fishing operation offer opportunities for groups of fishermen, from Schiedam or another town, for instance, to form a club of their own within the larger group of the Dutch herring fishermen? In order to answer this question it is necessary to analyze the nature of the fishing operation itself at sea and the behaviour of fishermen. How did the fishermen assist or hinder each other at sea, and how did they control and exchange knowledge of the best fishing places?

Buying fish with De Jonge Hendrik Jacob

On a Tuesday morning, 16 June 1789, the crew aboard the *hoeker*, called *De jonge Hendrik Jacob*, lifted anchor in northern Holland, set

²⁶ NA, ACGV inv. no. 387–395 and 626–654.

sail and headed out of the Zuiderzee. The *hoeker* and the *buis* were the preferred types of vessels used in the Dutch offshore herring fisheries both for fishing and as *ventjagers*. The whereabouts of this particular *hoeker* is known because a diary of the voyage has survived, written by the captain of the ship, Jacob Zalmten.²⁷ The investor was the merchant Cornelis Jantjes from Enkhuizen, and the *hoeker* served as the second *ventjager* of the Noorderkwartier in the fishing season of 1789.

The diary was written in prose, providing an eyewitness account of life at sea. The *ventjager* left the Netherlands in the company of some 30 herring vessels, and on Friday, 19 June, the *De jonge Hendrik Jacob* reached the Shetland Islands and anchored in the Baai van Hitland, on the east coast of the main island near the town of Lerwick. This bay was the main meeting point of the Dutch fishing fleet, where they could rest, buy provisions on land and still be close to the summer fishing grounds.

In the following days more and more vessels arrived at the Baai van Hitland, and on Wednesday, 24 June, when the fisheries started, more than 130 Dutch herring vessels headed out to the fishing places, where they would set out their drift nets in the evening and pull them in again in the early morning. The crew of *De jonge Hendrik Jacob* was ready to receive herring on the morning of the 25 June, and 'waved at a few ships for catch but nothing had been caught as far as we could see there were no signs of catches.'²⁸

The next morning, the *De jonge Hendrik Jacob* was ready again to scout for signs of herring vessels, and to the northeast the crew saw another *ventjager* with eight to ten herring vessels drifting by, as if they were about to hand over herring. Later that day they caught sight of the first *ventjager* from Vlaardingen and a fleet of about sixty herring vessels was spotted sailing to the south-west.

On Sunday, when the fishermen were resting after not having put out their nets on Saturday night the *ventjagers* had time to communicate with the first *ventjager* of Enkhuizen, who spread the word that the first *ventjager* from Vlaardingen had already sailed back with a last of only thirteen barrels of salted herring.

On Monday morning the crew of *De jonge Hendrik Jacob* continued its search for freshly salted herring, but with little success. Using flags as

²⁷ 'De Jonge Hendrik Jacob', Scheepvaartsmuseum, Amsterdam, inv. no. 5 187.

²⁸ 'De Jonge Hendrik Jacob', 25 June 1789.

signals the crew communicated with several ships both from Vlaardingen, Maassluis and Enkhuizen, but only a few herring had been caught. The *De jonge Hendrik Jacob* stayed with a fleet of thirty to forty vessels and Friday morning they finally 'saw a few ships with the flag up, we spoke to the ships...' and eight different ships handed over a total of 15 ¼ barrels of herring.²⁹

On Monday night of the following week, the *De jonge Hendrik Jacob* was within sight of fourteen to fifteen ships setting out their nets. The following morning, twenty vessels were in the area, and one vessel handed over herring to the *De jonge Hendrik Jacob*. After a slow start, the crew was more successful the following week, becoming more prosperous, and the description in the diary of the second week is a further indication of the high level of communication taking place at sea. On Wednesday, eight vessels handed over a total of forty-four barrels of salted herring, and on Thursday one hundred and eleven barrels came aboard. The crew of the *De jonge Hendrik Jacob* first obtained the herring from eight different vessels. Later the same day they cruised around and suddenly to the north 'saw we a ship in front of us laying out its net, with its flag waving from the top and immediately we went there to hear what herring they had for us, and who the skipper was and we found it clearly to be Jacob van de Spek (with) 133 barrels of salted herring.'³⁰

On Friday, 10 July, *De jonge Hendrik Jacob* had collected a total of 214 barrels of salted packed herring, or the equivalent of fifteen lasts and four barrels, with which captain Jacob Zalmten and his crew must have been content. They started to move south, encountering about fifty herring vessels near Fair Isle in between the Shetlands and Orkney Islands. On Sunday, 12 July, they estimated their position to be 58 degrees and 25 minutes, which is off the Scottish coast, and three days later they reached the shallow waters of Doggersbank. The homebound journey seems to have been slowed down by still and bright summer days, but finally on the morning of 22 July they caught sight of Egmond aan Zee and later that day they managed to get inside the Zuiderzee area.

Judging from the testimonies of the above landings of herring by *ventjagers* as well as the regulations imposed by the *College van de Grote Visserij*, this journey of the *ventjager*, *De jonge Hendrik Jacob*, seems to

²⁹ 'De Jonge Hendrik Jacob', 3 July 1789.

³⁰ 'De Jonge Hendrik Jacob', 9 July 1789.

give a representative eyewitness account of the Dutch herring fishery in the first four weeks of the season. For every day spent at the herring fishing grounds, the diary contains information on fishing vessels appearing within eyesight of the *De jonge Hendrik Jacob*, and in the days of fishing they encountered as many as fifty vessels during one day. This was a substantial part of the 180 Dutch vessels active in the season of 1789.³¹

Fishermen were able to communicate with everybody within sight by way of flags raised to the top of the mast. In this way, the fishermen who had just caught a given amount of herring could sell it to the *ventjager*. In the process of learning that barrels of herring were obtainable from one boat in the area, all other fishermen in the area would acquire the same information. Knowledge of where the schools of herring were moving was a valuable economic asset, but in the context of the Dutch North Sea herring fishery, it seems to have been an asset shared rather freely among the skippers. If indeed it was the case that the individual skippers formed one large group or information-sharing club, one should expect that the temporality of catches was influenced by this. With regards to the business operation of buying herring in the open sea, there is reason to believe the information in the diary or journal of the *De jonge Hendrik Jacob* to be accurate. Bearing in mind that *De jonge Hendrik Jacob* was in the vicinity of so many vessels every day, it is striking that virtually all of the acquisitions of herring took place during the course of five days, 29 and 30 June, and from 7 to 9 July. This reveals that not just one or two vessels, but a large part of the group of herring vessels fishing near each other, had hit schools of herring at virtually the same time, which makes sense if they hunted together and engaged in an unlimited trade of information.

As with the business of the *ventjagers*, the fishermen also had to abide by regulations on fishing and communicating. Beside the above-mentioned general regulations on who was allowed to take part in the herring fisheries, the length of the season, what fishing gear to use and the quality of the fish, the *College van de Grote Visserij* also imposed a number of official codes of conduct, which the fishermen were obliged to follow when fishing. The most thorough regulatory measures stem from the 1580 body of laws.

³¹ Kranenburg (1946) 222.

What seems to have been a focal issue was not to get in the way of others, and 'everybody taking part in the herring fisheries should beware of keeping the rudder clear of nets drifting in the sea.'³² In fact, several articles explain how one should go about handling one's own nets, and the nets of others. Article 5 even stipulated that he who physically or otherwise harassed a fellow fisherman should be corporally punished, suggesting that problems of this nature could arise.³³

The laws also specified some means of communicating with each other. For instance, when a ship arrived at its destination and the weather was suitable, the skippers were to place a signal at *aft*, the back end of the ship indicating that they were ready to fish. When the sun set and the time was right for fishing, the skippers raised the anchor and commenced fishing. Skippers who did not take part in the actual fishing but harassed the other fishermen by their presence would be penalized. No sitting on the fence was tolerated. If anyone had encountered bad weather, he was to set up a light at the *bow*. When he was raising the anchor again, about to set out the nets, he should then set up a second light in the front of the ship. Furthermore, he was not to turn out the second light before the anchor had reached the ground again.³⁴ The renewed laws from 1801 were less detailed on the topic of behaviour at sea, but the main issues of keeping clear of other fishermen's nets and signalling with lights when fishing were still upheld.³⁵ A further renewal in 1820 specified that the skippers were obliged to put up a flag when herring was caught.³⁶

To the extent that the above regulations were observed, the putting up of lights to signal when one was fishing would communicate to any neighbouring fishermen that fishing was going on. The rules of conduct imposed by the *College van de Grote Visserij* seem primarily to have played the role of avoiding trouble at sea. So, what happened during the everyday practice of fishing? How did good and bad news of the fishing spread? In the period of almost three centuries ending around 1860, tens of thousands of fishermen worked aboard the herring vessels, yet only a few accounts of the fishing operation were written down. A few

³² Cau (1658) vol. 1, 684. art. 1.

³³ Cau (1658) vol. 1, 684. art. 5.

³⁴ Cau (1658) vol. 1, 684. art. 2–4.

³⁵ 'Articulen', NA, ACGV inv. no. 686, 19–20.

³⁶ Assenberg (2001) 15.

surviving diaries and logbooks offer the chance to analyze the fisheries from the viewpoint of fishermen while they were at sea.

One such example comes from an important entrepreneurial family in the Vlaardingen herring industry, the Kikkert family. In 1848 Hendrik Kikkert, a ship-owner, had equipped five vessels for the herring fishery. Aboard one of the fishing vessels, the *hoeker* named *De Toekomst*, Hendrik Kikkert's son Cornelis wrote a diary of events that took place during a journey lasting from 3 to 30 June.³⁷ From this diary, we learn that in 1846 the starting date of the season was moved forward two weeks to 10 June, since reports from Scotland had already mentioned good fishing from early June.³⁸ The skipper of *De Toekomst*, Hermanus Schouten, and his crew took advantage of the extra time, and began their voyage on 3 June. Just before noon on 7 June they caught sight of the Shetlands. In the afternoon they arrived in the Baai van Hitland, where they found a large number of vessels. In the next few days, the crew of *De Toekomst* visited other vessels, and received visits from skippers in Hendrik Kikkert's fleet, as well as from other skippers from Vlaardingen.

In the following week *De Toekomst* fished in the area south of the Shetlands and communicated frequently with other vessels, both Kikkert's vessels and others. For instance, on 12th June *De Toekomst* appears to have been communicating with five other vessels, and exchanged information on how much each had caught. Two of the skippers with whom contact was made were Leendert Schouten and Cornelis Storm, who also fished for Kikkert, but *De Toekomst* also approached skippers from Vlaardingen and one from Amsterdam. It appears, therefore, that *De Toekomst* shared information with a number of vessels, not just the ones with which it was associated. But compared to the fishing fleet as a whole, how representative was the behaviour noted in this journal kept by Cornelis Kikkert?

The crew of *De Toekomst* and Cornelis Kikkert were part of an unusual fishing trip. Already on 25 June they stopped fishing and announced their journey home to two other vessels. In the afternoon they set sail to head back, brought some letters with them, and after what seemed a smooth journey without any references to meeting other vessels on

³⁷ Borsboom (1992) 42–52.

³⁸ Beaujon (1885) 263.

their way, they set foot on the quay in Vlaardingen on 30 June.³⁹ The short journey would in itself indicate that *De Toekomst* functioned as a *ventjager*, but this was not the case. The vessel was not on the approved list of *ventjagers* for the Zuiderkwartier, and there are no indications in the diary of Cornelis Kikkert that *De Toekomst* bought any barrels of herring. Instead, the crew was fishing like the other herring vessels, and on the same scale. On 22 June, for instance, the crew set out '46 netten', which is the equivalent of a full set of driftnets with a total length of about 1.4 km.

Some of the information from Cornelius' diary, however, can in fact be checked by way of logbooks from two other vessels fishing at the same time. The ship owner Jan Boon Jr., from De Rijk near Enkhuizen, had equipped the *buis*, *Het Bruine Paard*, for the herring fisheries, with Klaas Moeneswerf as skipper.⁴⁰ Coming from Vlaardingen, the *hoeker*, *Willem Beukelszoon*, was also at the fishing grounds off the Shetland Islands with Klaas Schep as skipper.⁴¹ The information in these two logbooks was written in preformatted tables, giving a high degree of uniformity, but not lending as much space for miscellaneous information as in Cornelis Kikkert's diary. Still, we can see that on Saturday night, 10 June, *De Toekomst*, *Willem Beukelszoon*, and *Het Bruine Paard* all set out their nets for the first time, off the Baai van Hitland. From *Willem Beukelszoon's* point of view, at least 100 vessels set out to fish on this night. This is surprising since normally the Dutch fishermen did not set out their nets on Saturday night in order to rest on Sundays. However, for the other Sundays, the 3, 17, and 24 June, there is nothing written in the logbook of *De Toekomst*, but presumably they rested, since the two other logbooks reveal that no nets were set out.

On 13th and 14th June *De Toekomst* did not fish. Kikkert wrote in his diary that 'stortregen', torrential rain, poured down on both days. On 15 June *De Toekomst* consulted Leendert and Willem Schouten who both said that no-one had caught very much so far, and that they had not fished at all for the previous two nights. The same goes for *Het Bruine Paard* and *Willem Beukelszoon*, judging from their logbooks, and rain is also mentioned in the journal of Willem Beukelszoon. *De Toekomst* was in between the Shetlands and the Orkneys near the Fair Isle, while

³⁹ Borsboom (1992) 50–52.

⁴⁰ 'Journaal van stuurman', Museum In 't Houten Huis, De Rijk, inv. no. 03537.

⁴¹ 'Willem Beukelszoon', NA, ACGV inv. nr. 682.

the two other vessels were north of the Shetlands. The weather situation, however, seems to have affected fisheries in both places.⁴²

In the following days *De Toekomst* traveled north again, and on the morning of 20 June the crew communicated with a Klaas Schep. He, in turn, told the men aboard *De Toekomst* that he had 'caught 2 barrels of herring in total and yesterday a few herring'.⁴³ Since Klaas Schep was the skipper of *Willem Beukelszoon*, his communication with Kikkert can be checked. In the logbook from *Willem Beukelszoon*, the tables reveal that two barrels of 'maatjes haring', herring not yet ripe, were caught on 20 June, and on the same day, at nine in the evening, both barrels were sold to the fourth *ventjager*. Another note in the logbook showed that the two barrels were caught on the latitude of 61 degrees north, which also corresponds with the information given in Cornelis Kikkert's diary.⁴⁴ Around noon on 20 June, shortly after speaking to the fortunate Klaas Schep, Kikkert wrote that they were on the 61 parallel.

Judging from the logbook, the two barrels that Klaas Schep handed over to the *ventjager* represented the first good catch he and his crew had made in that year's fishing season. When Klaas Schep told the crew aboard *De Toekomst* that he had only caught a few herring the night before, he was surely downplaying the size of his success the previous night. The personal relationship between Klaas Schep and the skipper Hermanus Schouten is not known, but it seems that in this case he was not telling the whole truth. During interviews with Danish fishermen in the 1980s the Danish social anthropologist Torben A. Vestergaard paid attention to how the creation of a special language amongst the group of fishermen was a way for them to keep information secret from the ones who were not trusted.⁴⁵ One possible explanation is that the notion of catching 'a few herring' was merely an understated tone used when Dutch herring fishermen spoke to each other at sea.

So, what seems to be a lie, since the 2 barrels were not aboard his ship 24 hours earlier, might have been acceptable information and even reasonably easy to decode for Hermanus Schouten, Cornelis Kikkert, and the rest of the crew of *De Toekomst*.

⁴² Borsboom (1992) 46–48.

⁴³ Borsboom (1992) 48.

⁴⁴ 'Willem Beukelszoon', NA, ACGV inv. nr. 682.

⁴⁵ Vestergaard (1989).

How do the experiences of the skippers fishing in the summer of 1848 fit into the larger picture of information sharing in the limited entry Dutch North Sea herring fisheries?

Communication and cooperation

The above-noted analysis of fishing strategies in the Dutch North Sea herring fishery serves to demonstrate the degree to which this historical fishery operated and conformed to modern theories on information sharing in limited entry fisheries. The fishermen of the *College van de Grote Visserij* were fishing far away from home targeting a migratory species such as North Sea herring. To the extent that they would fish in accordance with modern resource theory they could expect to catch more and reap a larger profit the more they co-operated with each other when fishing.

Fisheries managers today are becoming increasingly aware of the role of fishermen's knowledge and information sharing as a valuable source of knowledge. By the nature of their work, it is difficult to acquire such knowledge for fisheries managers, partly since this information is a potentially valuable professional asset.⁴⁶ Since it is difficult to undertake such an investigation on modern fisheries, does it make sense to undertake such an investigation on a long-gone, low-tech fishery, using archival material as the primary data?

When looking at the institutional set-up, the *College van de Grote Visserij* facilitated a limited entry fishery, and the concept of *ventjagers* certainly favoured co-operation amongst the Dutch fishermen operating within this framework. They co-operated not just within their own town or area, but also with fishermen from the rest of the Holland province. The analysis of the practice of the *ventjagers*, however, adds complexity to this notion. The *ventjagers* bought herring from all over the country, but they were more likely to buy fish from their neighbouring fishermen.

The journal of the *hoeker* the *De jonge Hendrik Jacob* illustrates how a *ventjager* was very much aware of the successes of different herring vessels fishing within its proximity. The fishermen had to communicate to the *ventjager*, by signalling with flags, lights or simply shouting, in

⁴⁶ Maurstad (2002) 159–166.

order to announce that they had caught herring and were ready to sell it at high sea. This made it difficult to hide information on good patches of herring between fishermen within eyesight of each other. Still, if *coarse grained* knowledge on where to fish was easily distributed, certainly not all *fine grained* knowledge was shared unfiltered. Three different accounts from fishermen fishing off Shetland in the summer of 1848 all provide ample information on different fishermen's success or lack thereof. The meeting between the two *hoekers*, *De Toekomst* and *Willem Beukelszoon*, on 20 June reveals that the information could be shared in a coded way or distorted, and some even withheld.

In the view of modern anthropological studies on information sharing amongst fishermen, this is not surprising. In the 1960s autumn fishery for herring off the Swedish west coast, the local fishermen were challenged in much the same way as the Dutch herring fishermen fishing in the North Sea in previous centuries. Valuable information was scarce in the search for fast moving herring schools but it was aided by radio communication, whereby the Swedish fishermen could coordinate their search. As one fisherman was quoted saying 'When anybody's radio suddenly becomes silent, that's a sign as good as any that he has come across herring.'⁴⁷ Nonetheless, in the Dutch North Sea herring fishery valuable information seems to have been shared. Testimonies from the *ventjagers* as well as the ordinary herring vessels indicate that the successful days of fishing often came in clusters, where many vessels in the same area would enjoy good catches during the same couple of days.

Conclusion

In conclusion, this study has applied economic resource theory and the results of anthropological case studies on modern fisheries in order to discuss information sharing in a historical context with a distinct institutional, technological, and cultural set-up. Whatever the finer limits were for information sharing in the Dutch North Sea herring fishery from c. 1600 to 1850, fishermen co-operated in managing the organisation of the fishery, as well as in the actual fishing operation far away from the shores of Holland. This is the first study based on archival studies of such a complete fishing organisation this far back in time. It

⁴⁷ Löfgren (1972) 88.

is not known whether other open-sea pre-modern fisheries, for instance in North America, had a similar degree of organisation.

This study highlights a highly sophisticated historical fishery, where the fishermen acted as much more than simple predators chasing their prey. Instead, if the analogy of predator-prey is adopted, the Dutch fishermen operated more like killer whales or piranhas, realising their mutual interests in hunting together in large groups. Formal and informal systems of sharing information and monopolising the benefits of the very valuable first catches of the season reveal a fishery with strong co-operative incentives, as a way to optimize catch rates. The modern economic concept of forming clubs of information sharing was, at least in practice, already realized in the Dutch herring fishery of the early modern era.

Three different accounts from fishermen fishing off Shetland in the summer of 1848 indicate that valuable information seems to have been shared among groups of Dutch fishermen. They also revealed that the whole truth was not always told, and some information held back. Similar to the behaviour of many modern herring fisheries, the Dutch fishermen hunted together, which is likely to have helped to optimize their gain. If any club members or free-riding fishermen violated the practices established, social as well as legal controls defended the interest of the club.

When looking at the institutional set-up, the *College van de Grote Visserij* facilitated a limited entry fishery, and the regulations concerning the *ventjagers* certainly favoured co-operation amongst the Dutch fishermen operating within this framework. They co-operated not just within their own town or area, but also with fishermen from the rest of the Holland provinces. The analysis of the practice of the *ventjagers* demonstrates how the *ventjagers* bought herring from all over the country. They were more likely to buy fish from their neighbouring fishermen, though, than from fishermen coming from the other end of Holland. This made it difficult to hide information on good patches of herring between fishermen fishing within eyesight of each other. Thus, even if one wanted to hide the information from other fishermen, this was not possible, if at the same time they wanted to attract *ventjagers* to sell their catch to at open sea.

The Dutch herring fishery was for centuries the largest fishery in Europe and the envy of foreign nations. During the first half of the seventeenth century, 700 to 800 herring vessels went out fishing every

season; following various periods of decline and stability in the overall fishing effort, a mere 150 vessels sailed out in the first half of the nineteenth century, but still the fishing operation was conducted more or less unchanged for a period of more than 250 years. One of the Dutch business secrets might have been their extensive use of information sharing and co-operation. As previously shown by Wilson and Johnson, fishermen hunting together drastically reduce their cost of searching.

Bibliography

Unpublished sources

- National Archives (NA), The Hague
 Archieven van de *Colleges van de Grote Visserij* (ACGV)
 'Keurboeken', registers van de te Vlaardingen aangevoerde en gekeurde haring, 1814–1821', inventory numbers 387–395
 'Registers van de te Vlaardingen ter keuring aangevoerde haring, 1823–1851', inv. nos. 626–654
 'Journalen van haringschepen, Willem Beukelszoon, 1848', inv. no. 682
 'Publicatie van het uitvoerende bewind der Bataafsche Republiek, houdende Ordonnantien en Maatregelen, concernerende het Vangen, Zouten, Havenen, Keuren, Pakken, Ophoogen en Leggen van den Haring, enz., (Delft, 28 July 1801), inv. no. 686
 Gemeentearchief (GA) Schiedam
 Gerechten van Schiedam
 'Haringcertificaten, 1680', inv. no. 618
 'Haringcertificaten, 1720', inv. no. 621
 Museum In 't Houten Huis, De Rijp
 'Journaal van stuurman Klaas Moeneswerf op het buisschip *Het Bruine Paard*', inv. no. 03537
 Scheepvaartsmuseum, Amsterdam
 'Jonge hendrik Jacob, jourdenaal gehouden op 't hoekerschip genaamt de Jonge Hendrik Jacob loopende van 1 Junij–22 Julij 1789', inv. no. 5 187

Bibliography

- Akveld, L.M. (1977) 'Noordzeevervisserij', F.J.A. Broeze, J.R. Bruijn and F.S. Gaastra eds., *Maritieme Geschiedenis der Nederlanden* 3 (Bussum: 1977).
 Assenberg, F. (2001) 'De haringjagerij, in het bijzonder te Vlaardingen in de negentiende eeuw', *Netwerk. Jaarboek Visserijmuseum* 12 (2001) 5–33.
 Beaujon, M.A. (1885) *Overzicht der geschiedenis van de Nederlandsche zeevischerijen* (Leiden: 1885).
 Bochove, C. van (2004) 'De Hollandse haringvisserij tijdens de vroegmoderne tijd', *Tijdschrift voor Sociale en Economische Geschiedenis* 1/1 (2004) 3–27.
 Borsboom, P. (1992) 'Het journaal van een zeereis uit 1848 door Cornelis Kikkert (1829–1917)', *Netwerk. Jaarboek Visserijmuseum* 3 (1992) 42–52.
 Cau, Cornelis (1658) *Groot plaacet-boeck, vervattende de placaten, ordonnantien ende edicten vande... Staten Generaal der Vereenighde Nederlanden ende Staten van hollandt en West-Vrieslandt, mitsgaders vande... Staten van Zeelandt: waer by noch ghevoeght zijn eenige placaten... 1* (The Hague: 1658).

- Gatewood, J.B. (1984) 'Cooperation, competition, and synergy: Information sharing groups among southeast Alaskan salmon seiners', *American Ethnologist* 11/2 (1984) 350–370.
- Gordon, H.S. (1954) 'The Economic theory of a common-property resource: The Fishery', *The Journal of Political Economy* 62/2 (1954) 124–142.
- Hardin, G. (1968) 'The tragedy of the Commons', *Science* 162/3859 (1968) 1243–1248.
- Hilborn, R. and C.J. Walters (1992) *Quantitative fisheries stock assessment. Choice, dynamics and uncertainty* (London: 1992).
- ICES (2003) *Report of the Herring Assessment Working Group for the Area South of 62°N*. ICES CM 2003/ACFM:17 (ICES Headquarters: 11–20 March 2003).
- Jennings, S., M.J. Kaiser and J.D. Reynolds (2001) *Marine fisheries ecology* (Oxford: 2001).
- Johnson, N.S. (1993) *Synergies in the commons: Information sharing in limited entry fisheries* (University of Washington: 1993).
- Kranenburg, H.A.H. (1946) *De zeevisserij van Holland in den tijd der Republiek* (Amsterdam: 1946).
- Löfgren, O. (1972) 'Resource management and family firms: Swedish West Coast fishermen' in: R. Andersen and C. Wadel eds., *North Atlantic fishermen: Anthropological essays on modern fishing* (St. John's: 1972).
- Maurstad, A. (2002) 'Fishing in murky waters—ethics and politics of research on fishermen knowledge', *Marine Policy* 26 (2002) 159–166.
- Mietes, A.A. (1984a) *De archieven van de colleges van de Grote Visserij, 1578–1857 (1859)* (The Hague: 1984).
- . (1984b) 'De Hollandse visserijcolleges', *Holland. Regionaal-historisch tijdschrift* 16 (1984) 166–172.
- Tillema, J.E. (1917) *Ontwikkeling van de Nederlandsche haringvisserij in den loop der eeuwen* (Rijswijk: 1917).
- Vestergaard, T.A. (1989) 'Hemmeligheden ved fiskeriet. At finde ud af hvad man ved i Danmark', in K. Hastrup and K. Ramløv eds., *Kulturanalyse. Fortolkningens forløb i antropologien* (Viborg: 1989).
- Vries, J. de, and Ad van der Woude (1997) *The first modern economy: success, failure, and perseverance of the Dutch economy, 1500–1815* (Cambridge: 1997).
- Wilson, J.A. (1990) 'Fishing for knowledge', *Land Economics* 66/1 (1990) 12–29.